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**Rothkopf et al.**

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(54) **DISPLAY SYSTEM**

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**Related U.S. Application Data**

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(51) **Int. Cl.**
***H02J 7/00*** (2006.01)
***G06F 1/16*** (2006.01)
(Continued)

(52) **U.S. Cl.**
CPC ....... ***G06F 1/1632*** (2013.01); ***G02B 27/0176*** (2013.01); ***G06F 1/163*** (2013.01); ***G06F 3/002*** (2013.01); ***H02J 7/00*** (2013.01); ***H02J 7/0042*** (2013.01); ***H02J 7/0044*** (2013.01); ***H02J 7/025*** (2013.01); ***H02J 50/10*** (2016.02); ***H02J 50/90*** (2016.02); *G02B 27/017* (2013.01); *G02B 2027/0163* (2013.01); *G06F 3/011* (2013.01); *G06F 3/012* (2013.01); *H02J 50/40* (2016.02); *H02J 50/402* (2020.01)

(58) **Field of Classification Search**
None
See application file for complete search history.

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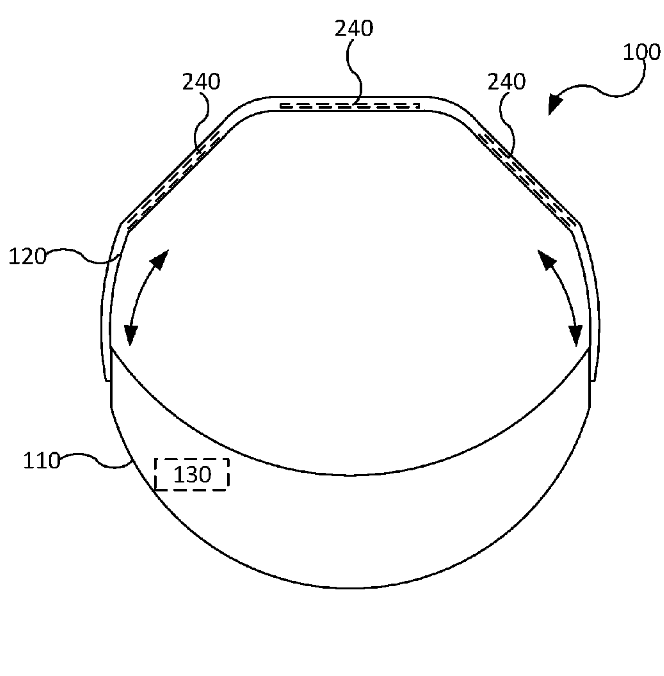
(57) **ABSTRACT**

A head-mounted display includes a display unit, a head support, a power storage device, and one or more receiving coils. The head support is coupled to the display unit and configured to engage a head of a user for supporting the display unit thereon. The power storage device is coupled to the display unit for storing power to be supplied to the display unit. The one or more receiving coils are coupled to the head support for inductively charging the power storage device.

**20 Claims, 15 Drawing Sheets**



(51) **Int. Cl.**

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|---|---|
| ***H02J 7/02*** | (2016.01) |
| ***G06F 3/00*** | (2006.01) |
| ***H02J 50/90*** | (2016.01) |
| ***G02B 27/01*** | (2006.01) |
| ***H02J 50/10*** | (2016.01) |
| *H02J 50/40* | (2016.01) |
| *G06F 3/01* | (2006.01) |

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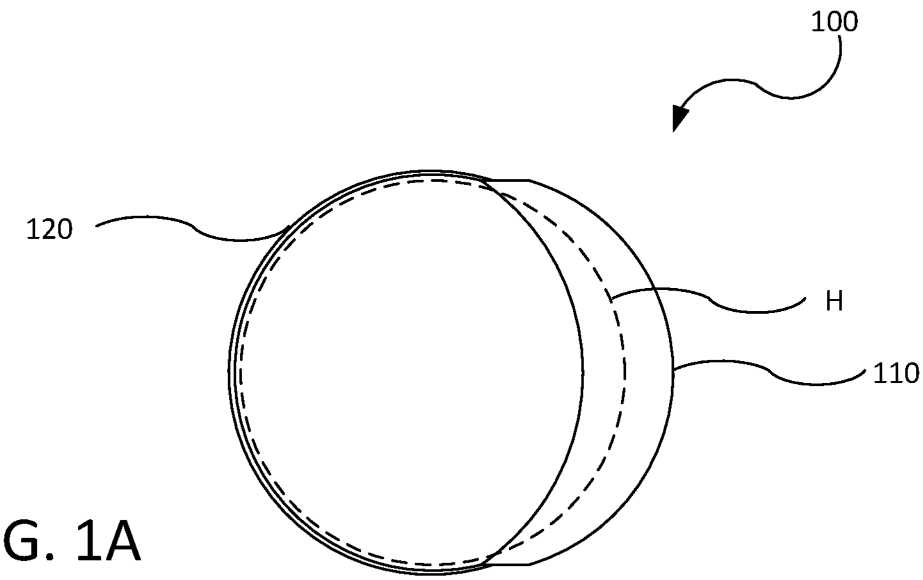


FIG. 1A

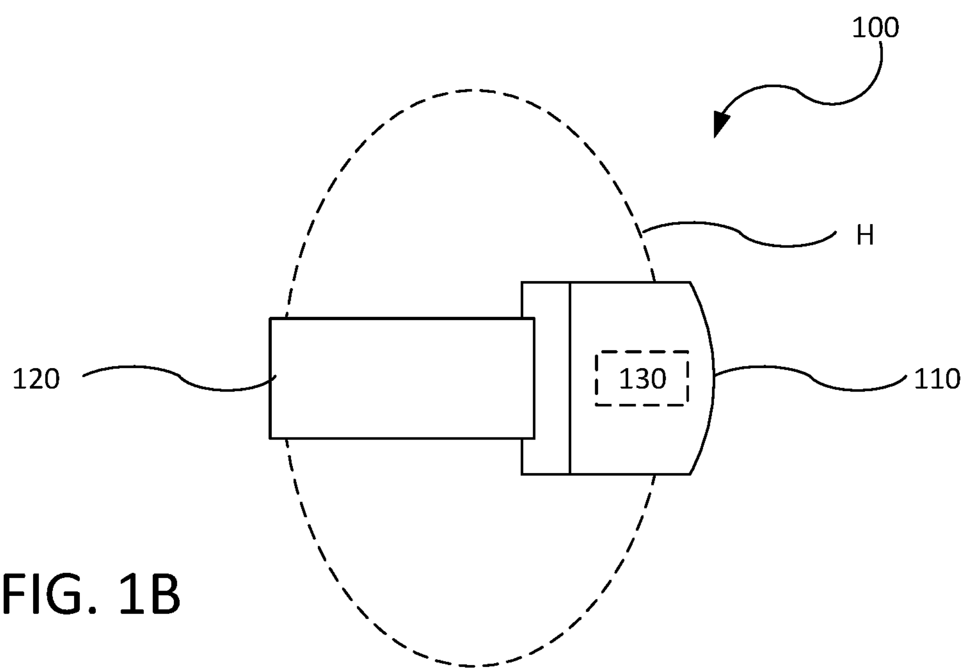


FIG. 1B

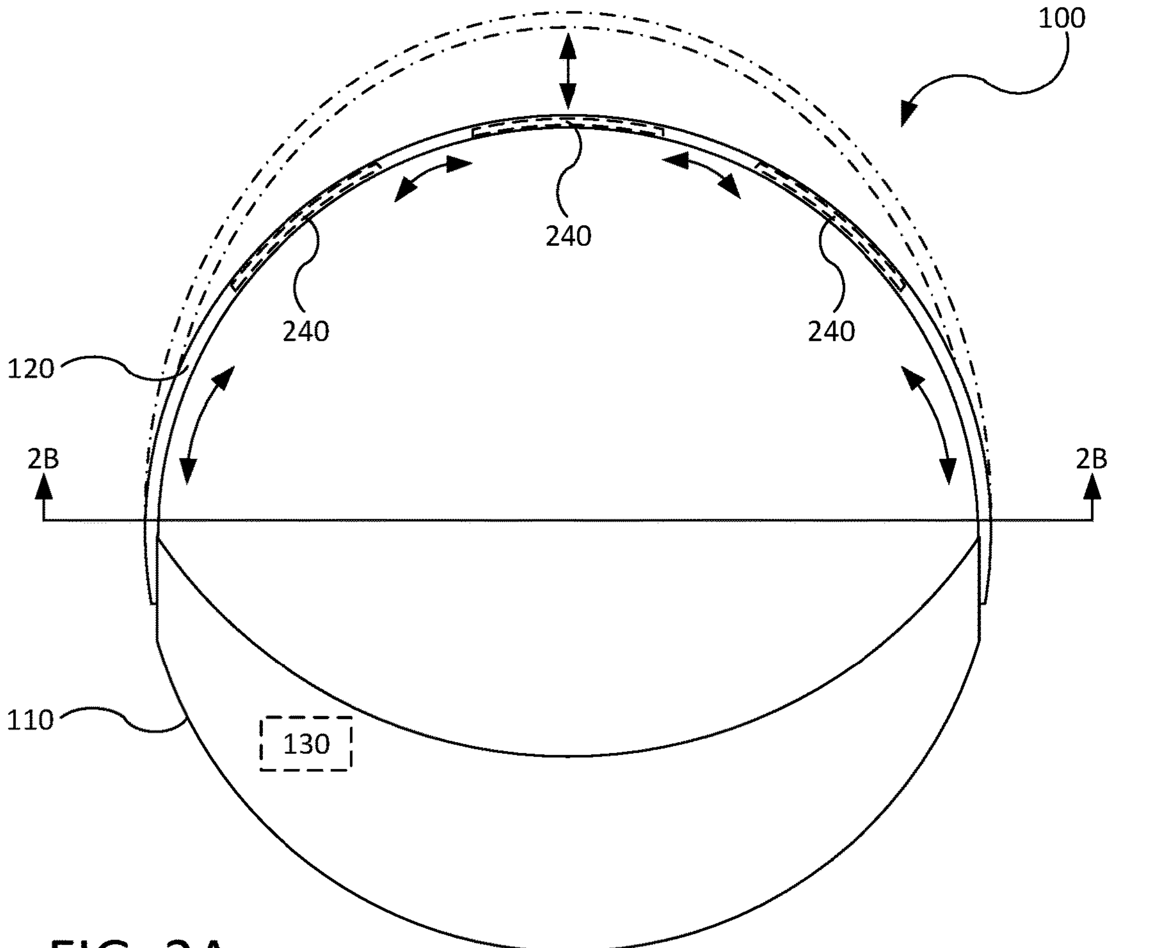


FIG. 2A

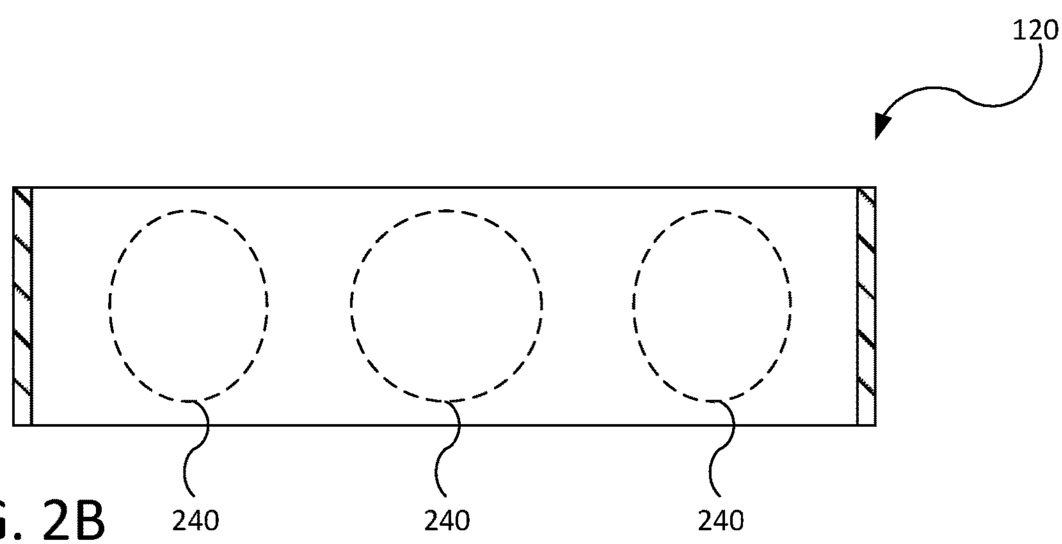


FIG. 2B

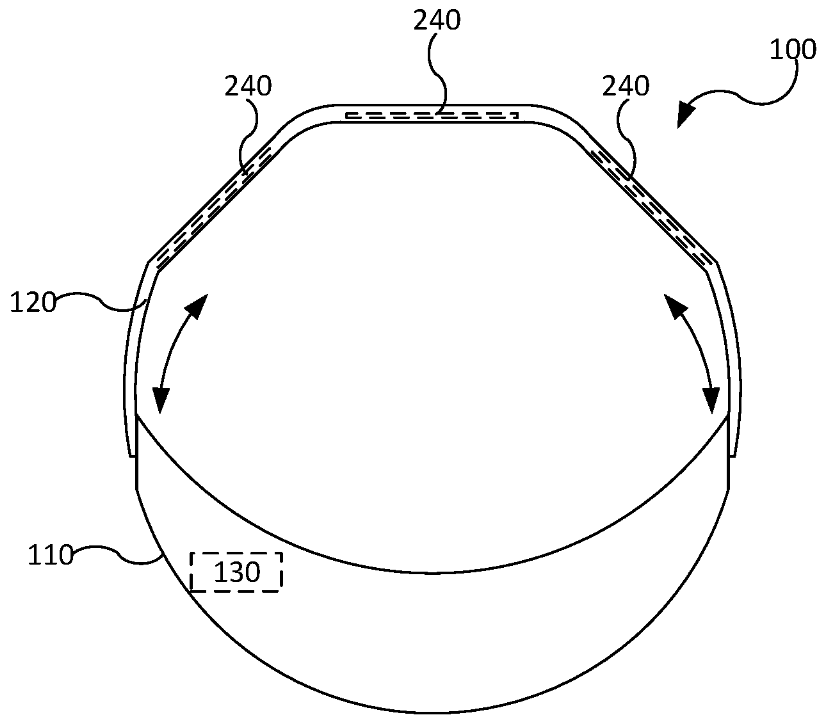


FIG. 2C

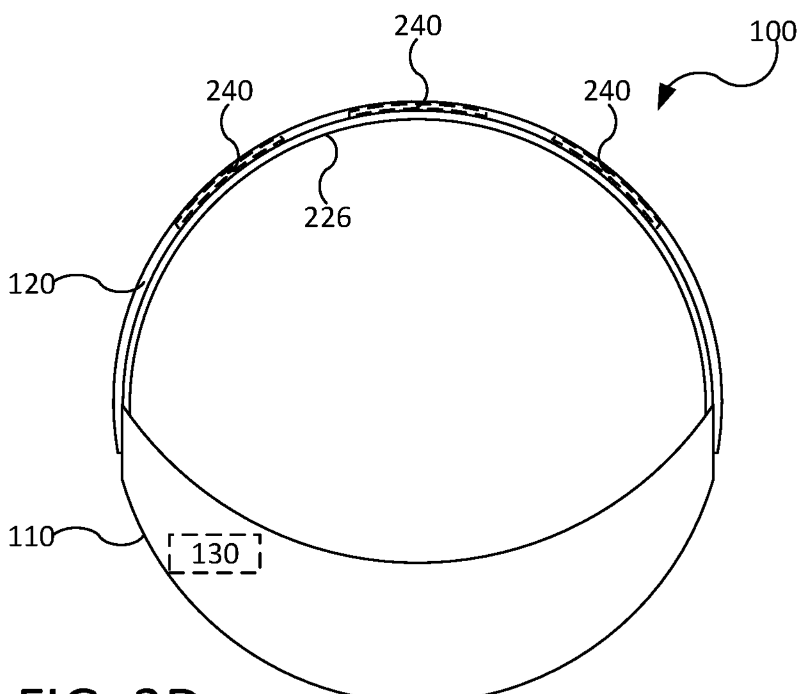


FIG. 2D

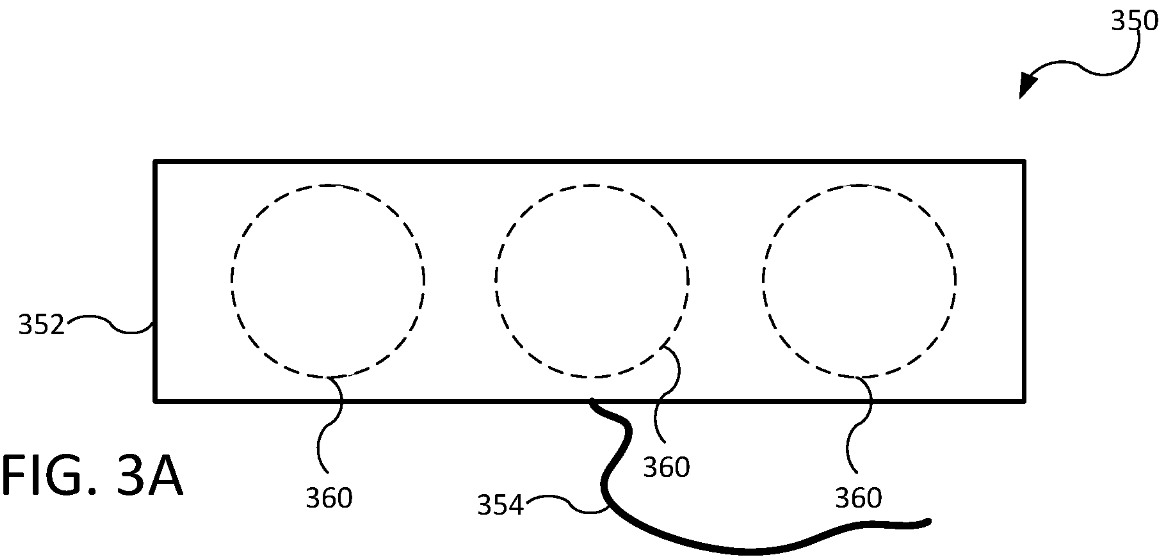


FIG. 3A

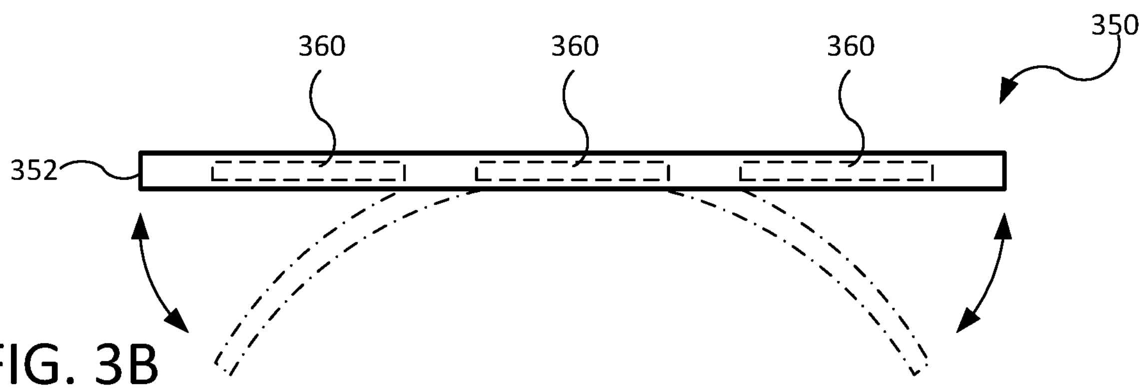


FIG. 3B

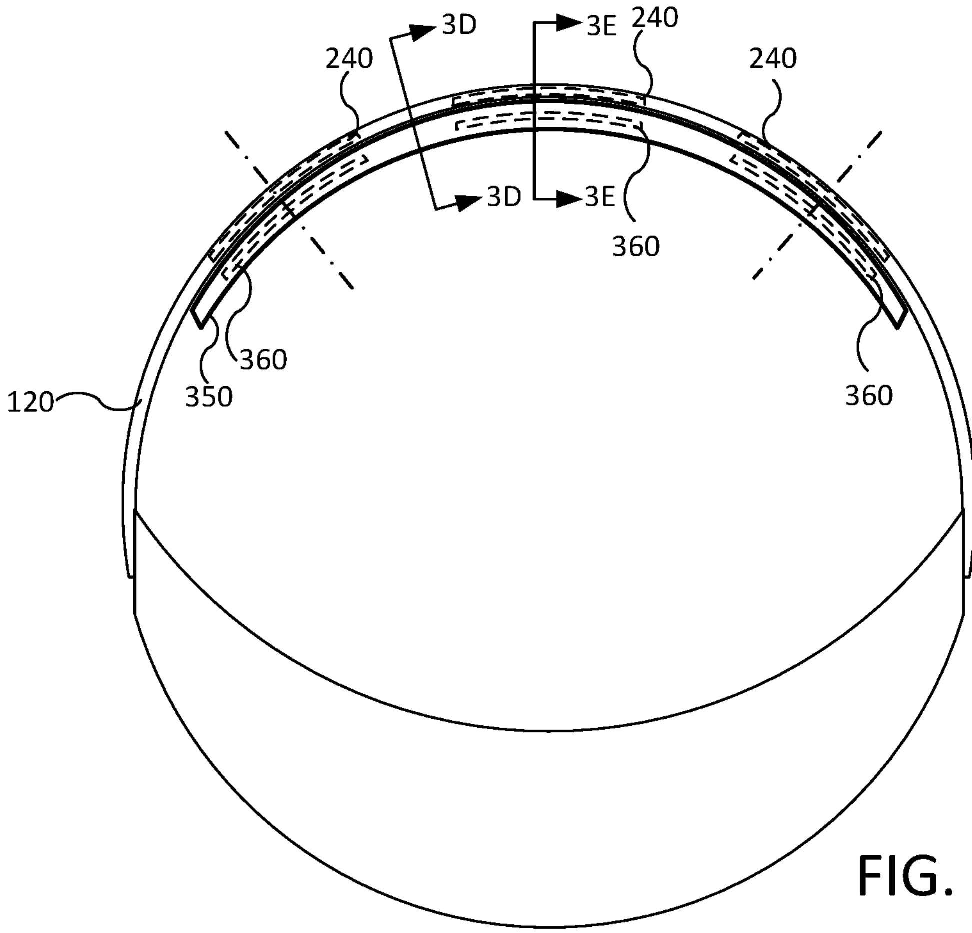


FIG. 3C

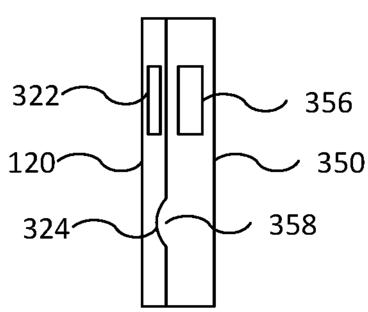


FIG. 3D

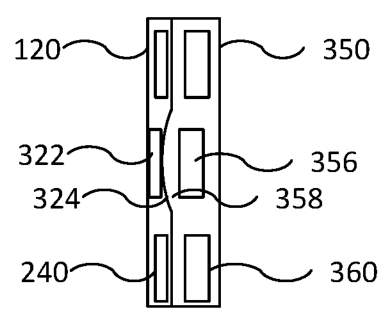


FIG. 3E

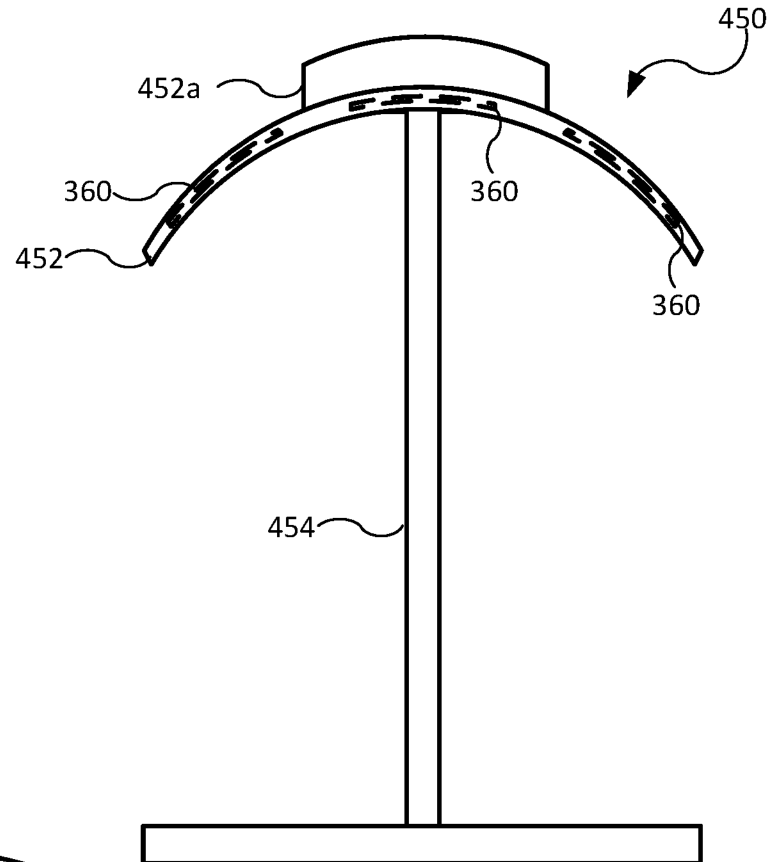


FIG. 4A

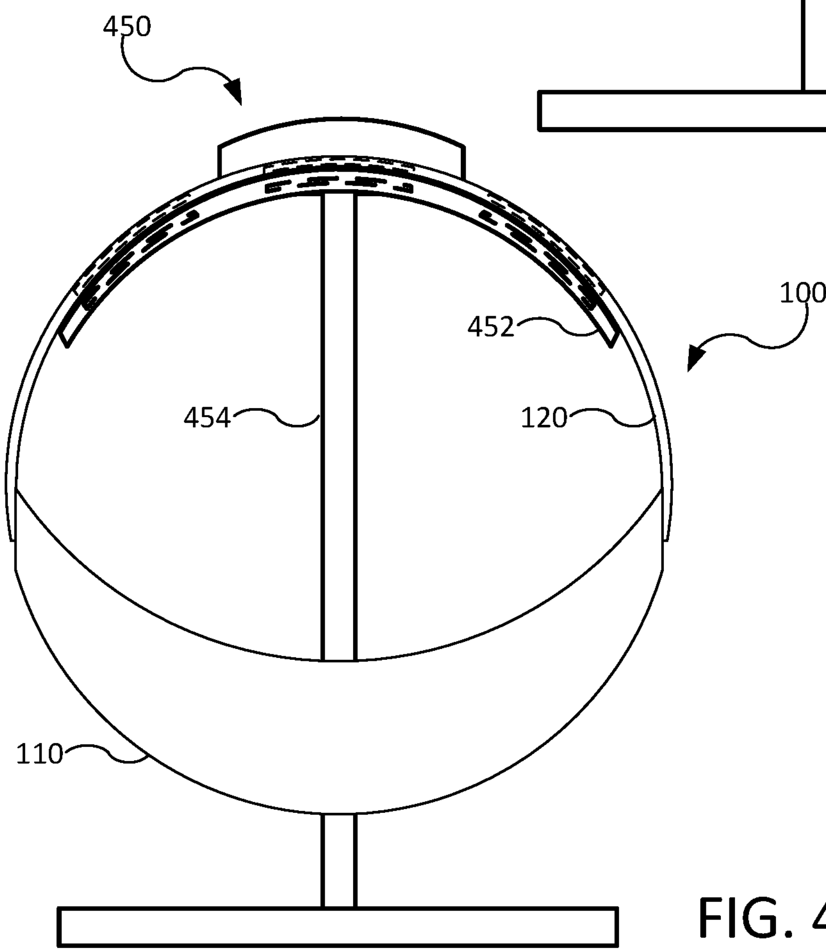


FIG. 4B

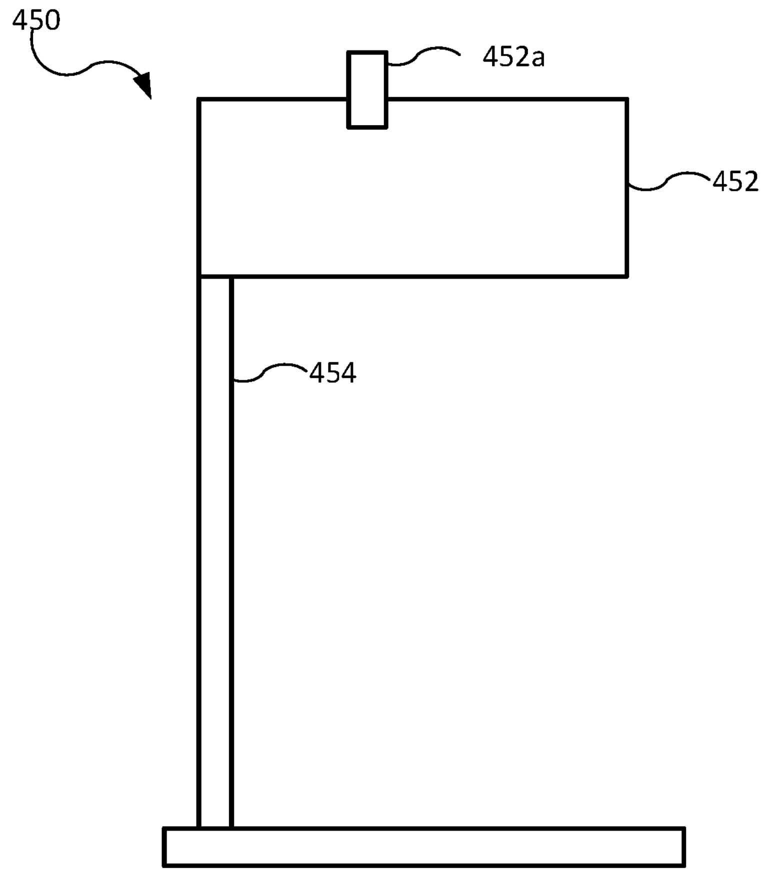


FIG. 4C

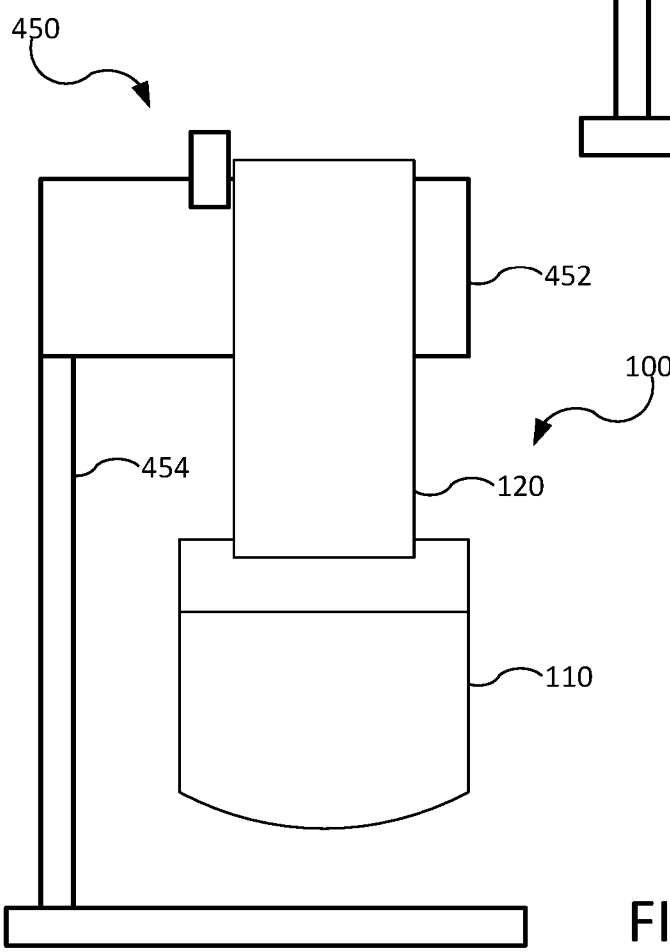


FIG. 4D

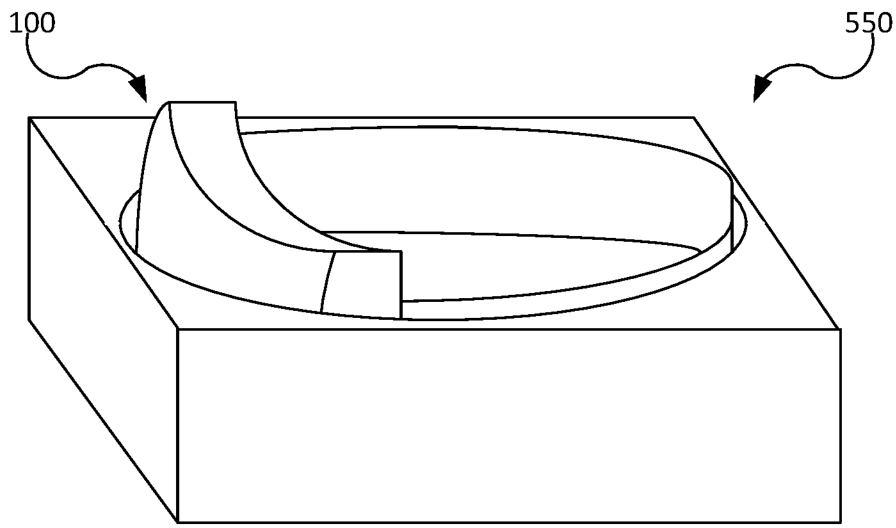


FIG. 5A

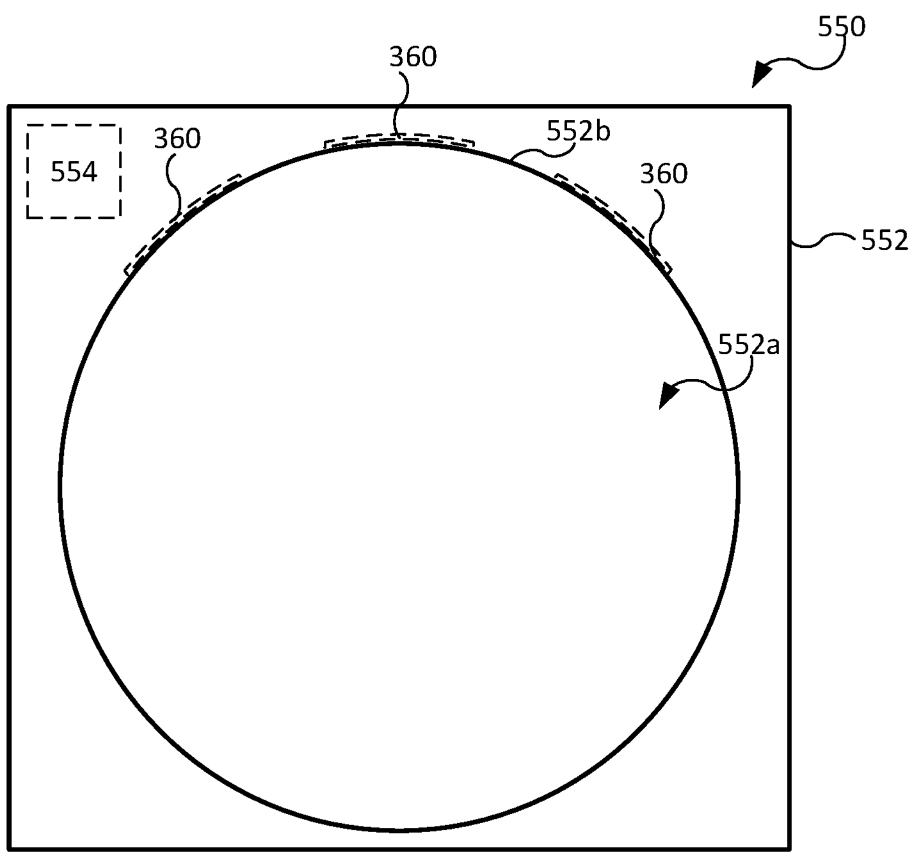


FIG. 5B

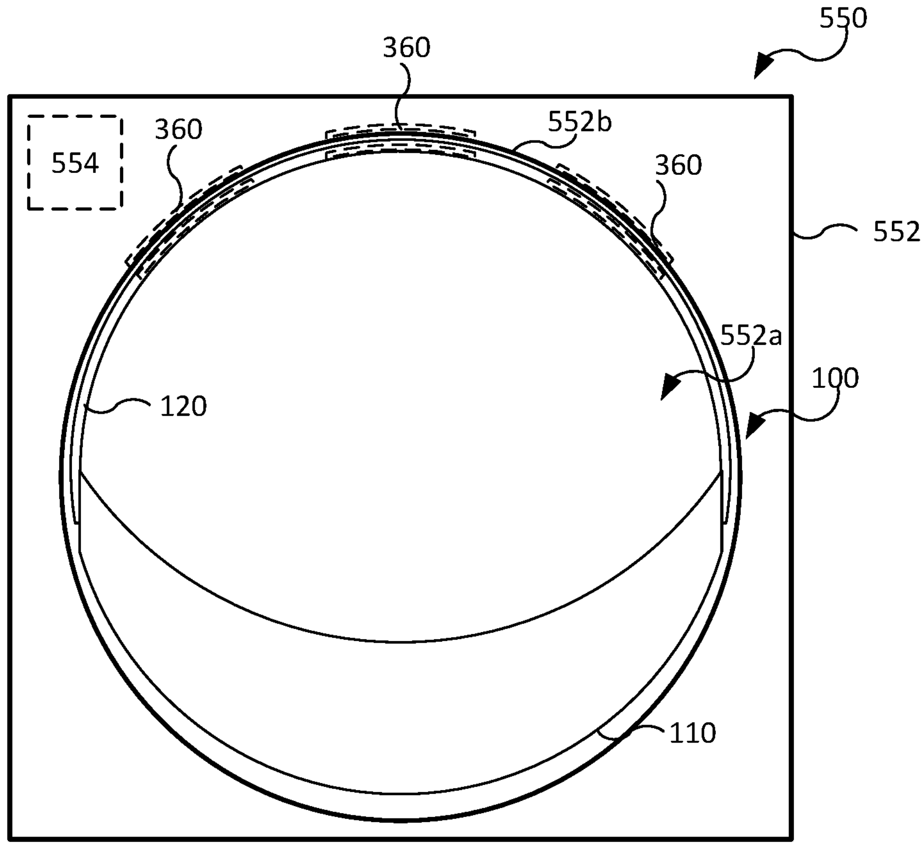
550
360
360
552b
360
554
552
552a
100
120
110

FIG. 5C

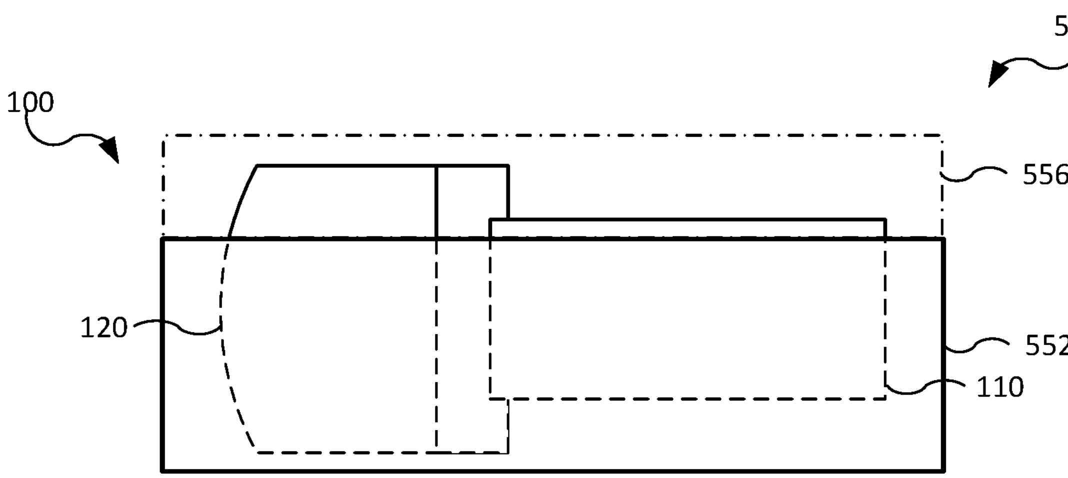
550
100
556
120
552
110

FIG. 5D

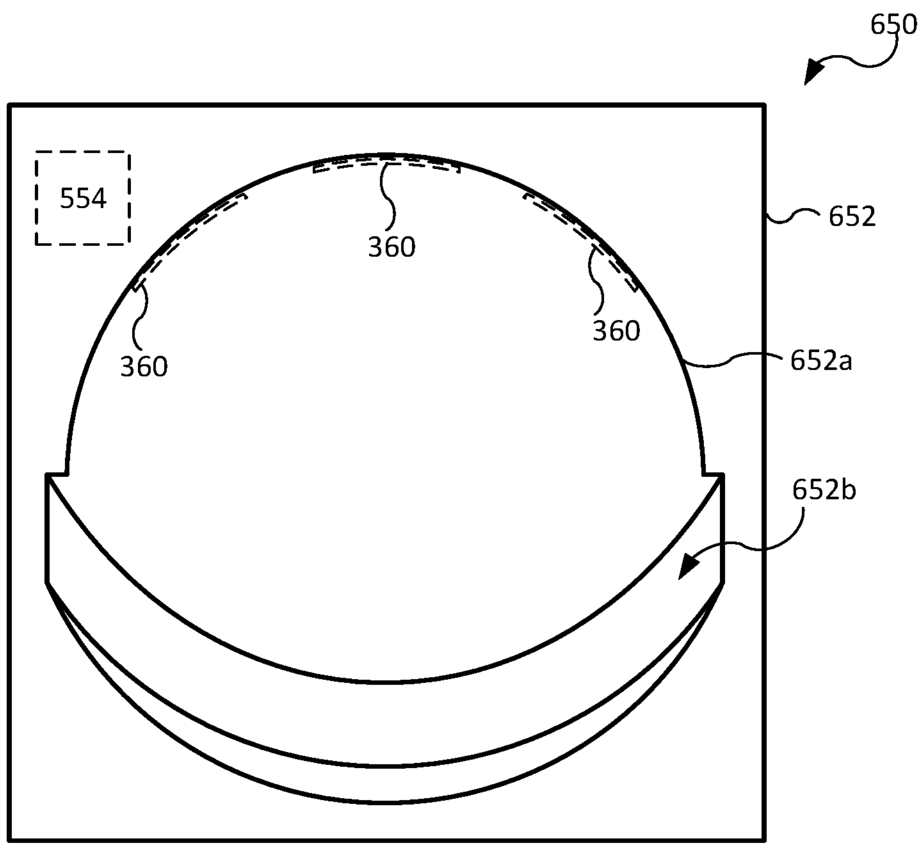


FIG. 6A

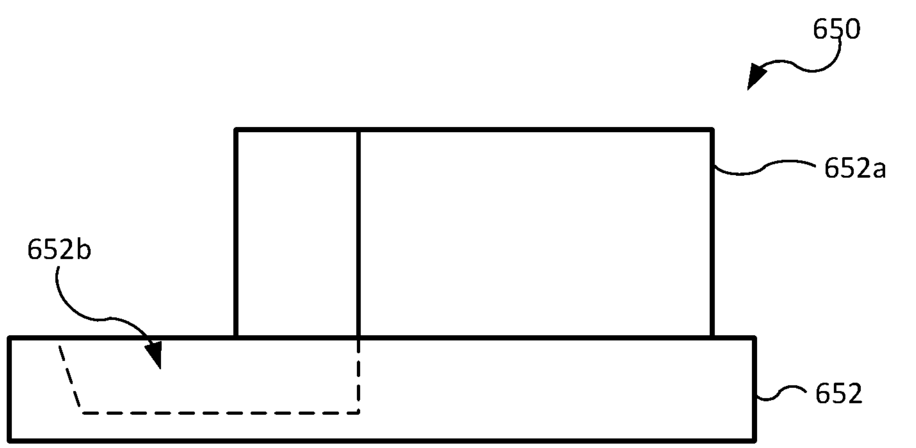


FIG. 6B

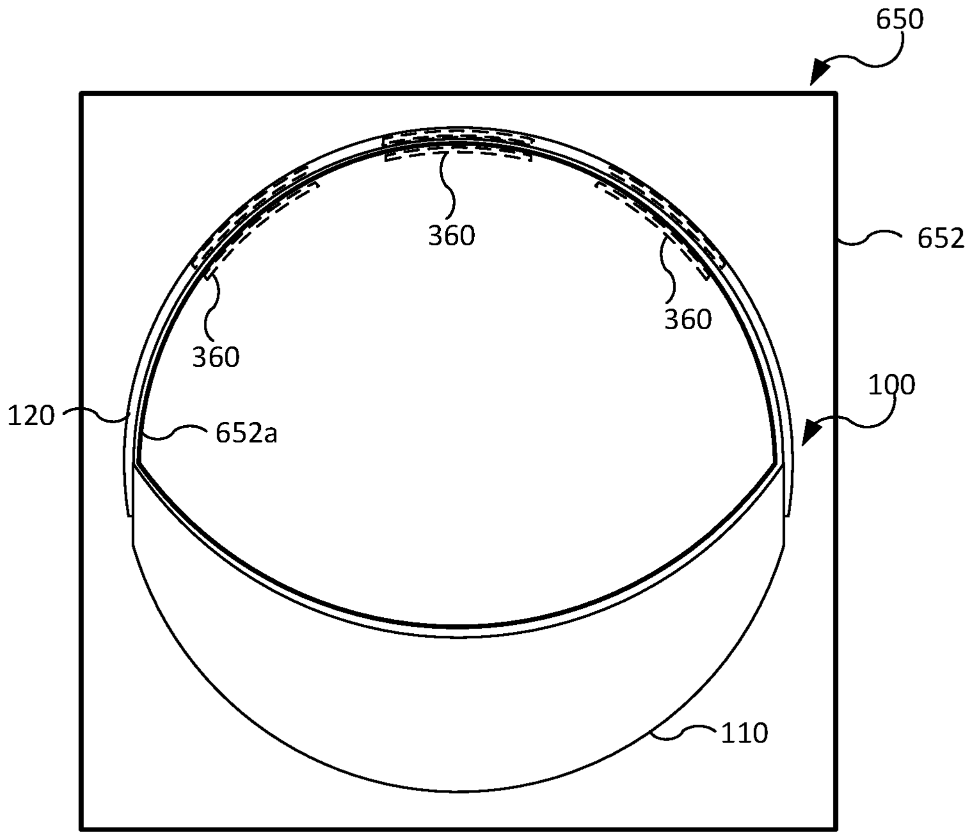


FIG. 6C

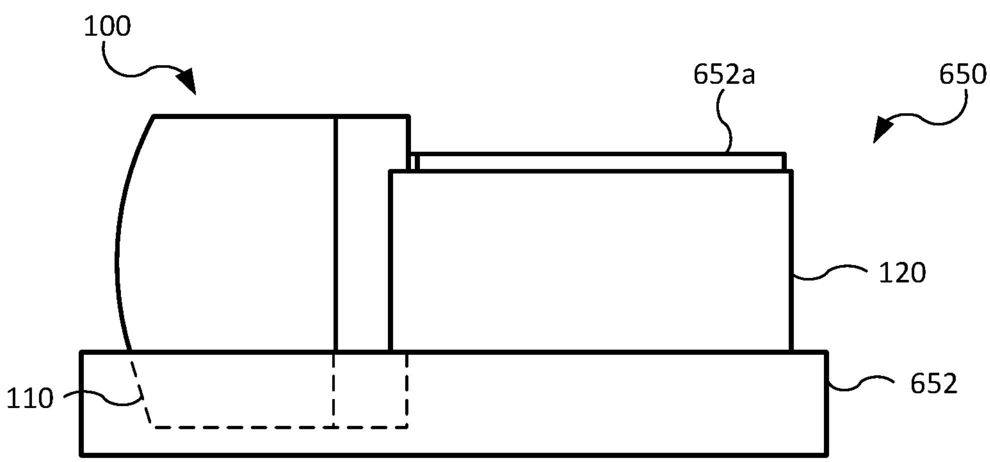


FIG. 6D

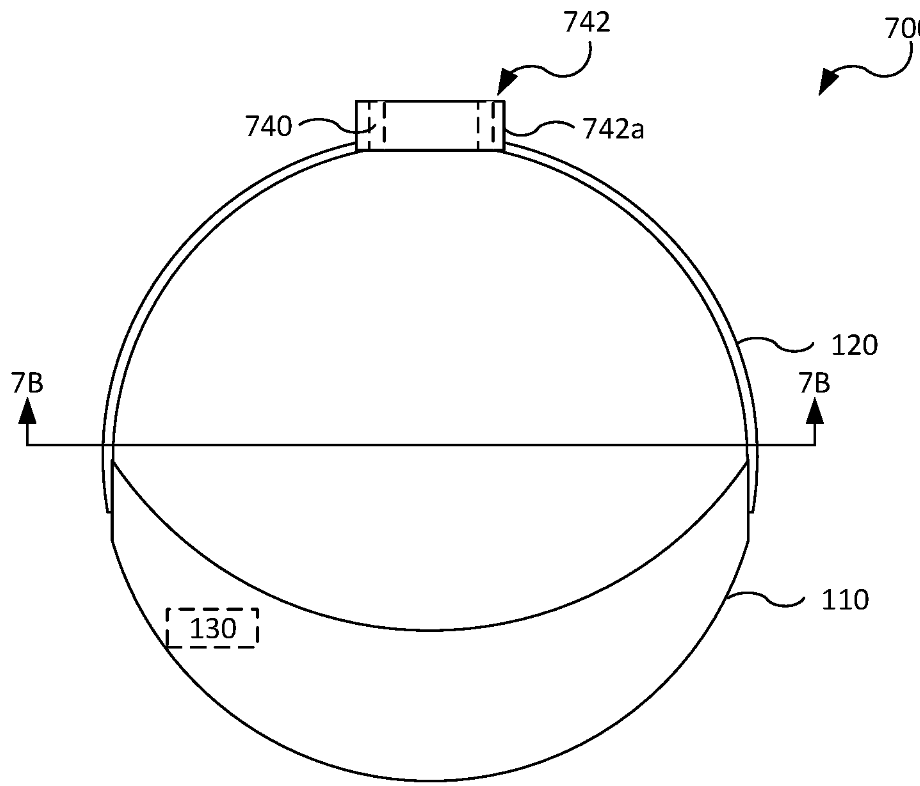


FIG. 7A

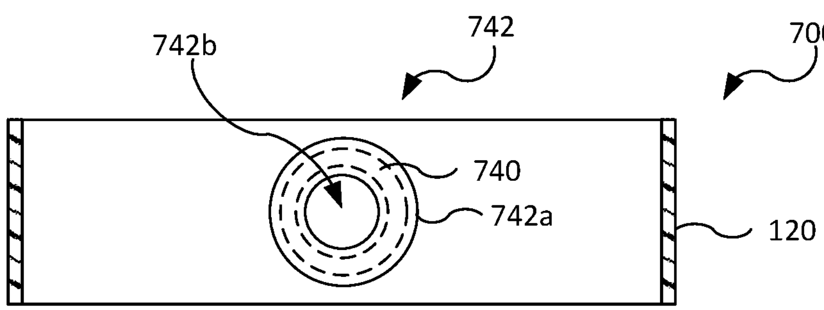


FIG. 7B

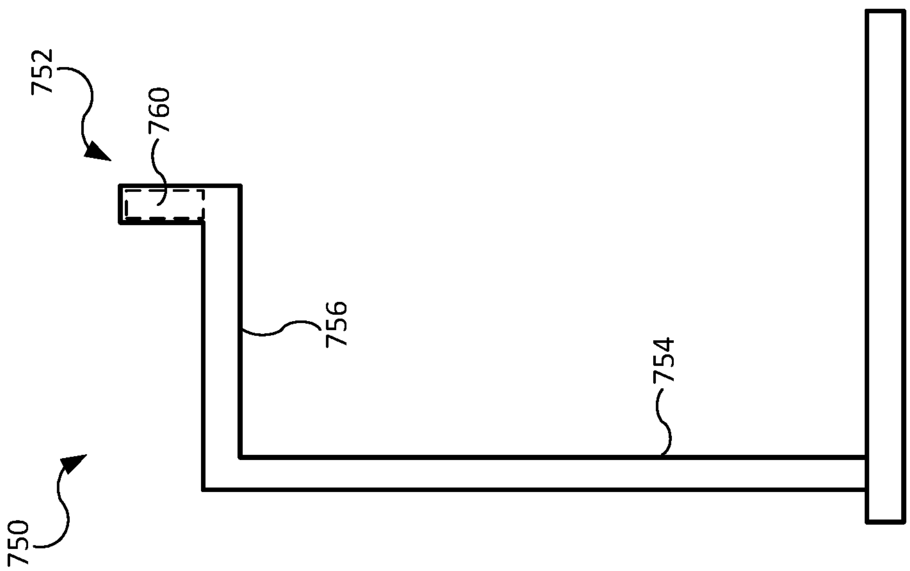


FIG. 7D

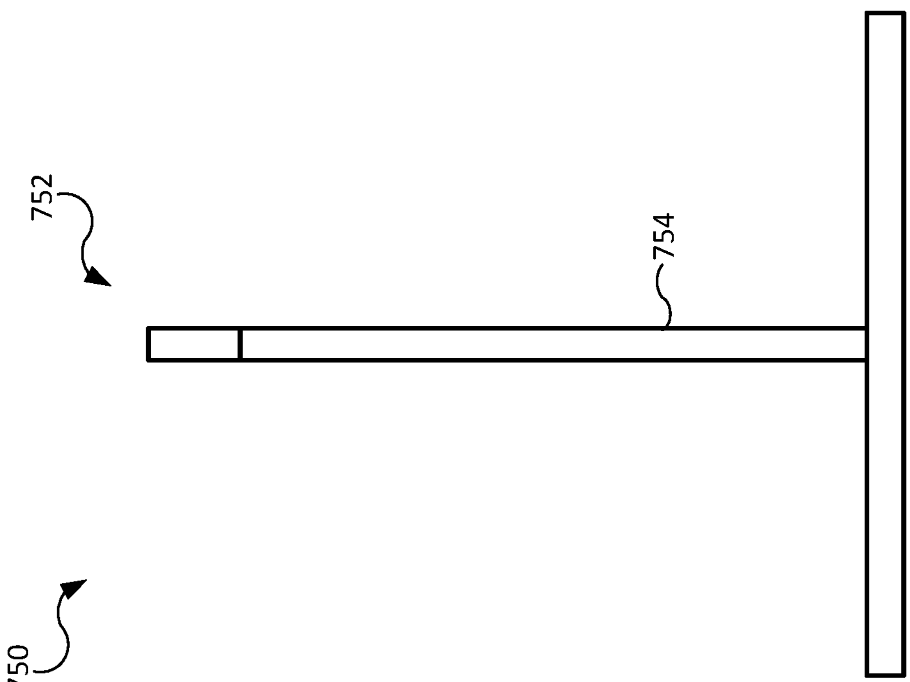


FIG. 7C

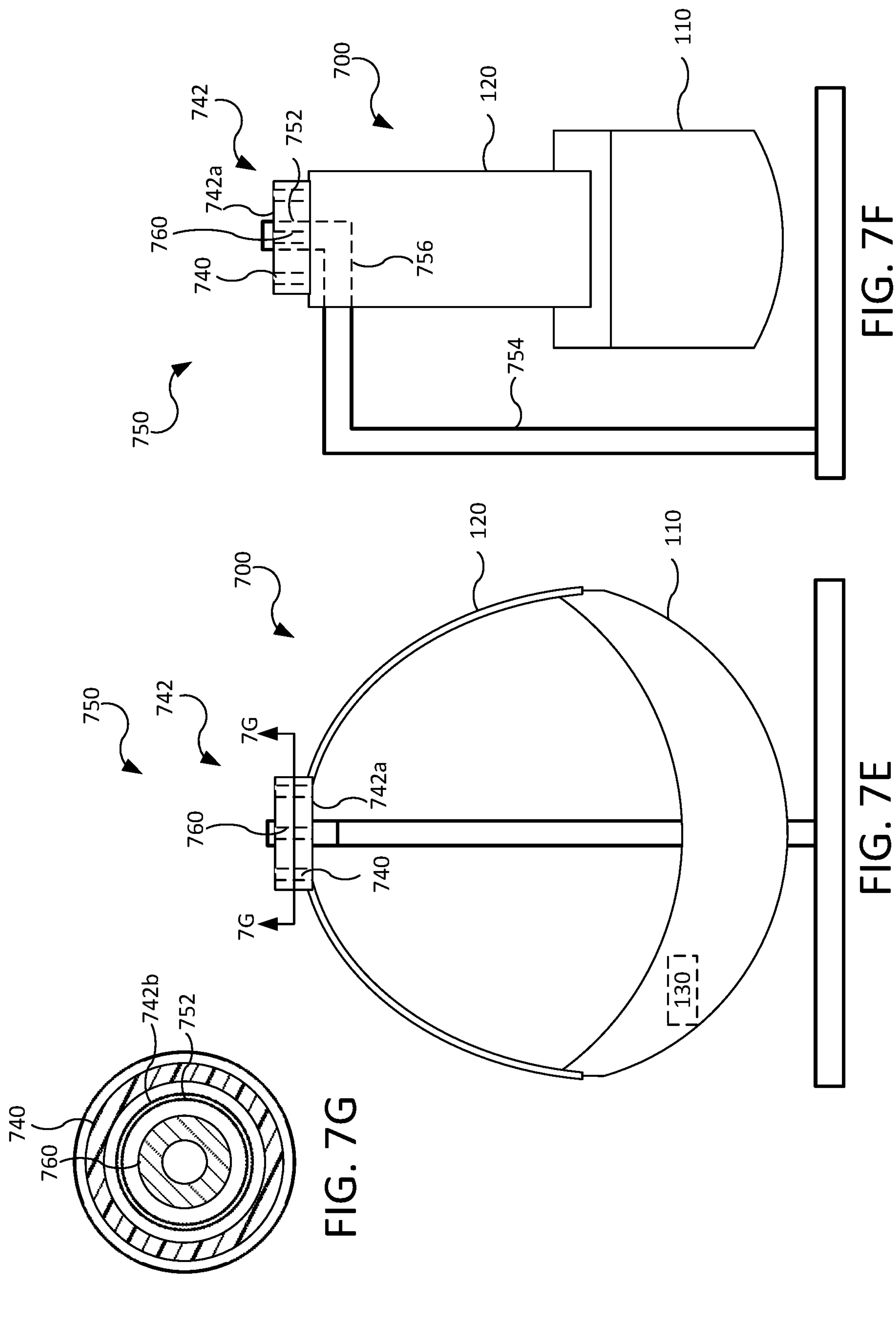


FIG. 7F

FIG. 7E

FIG. 7G

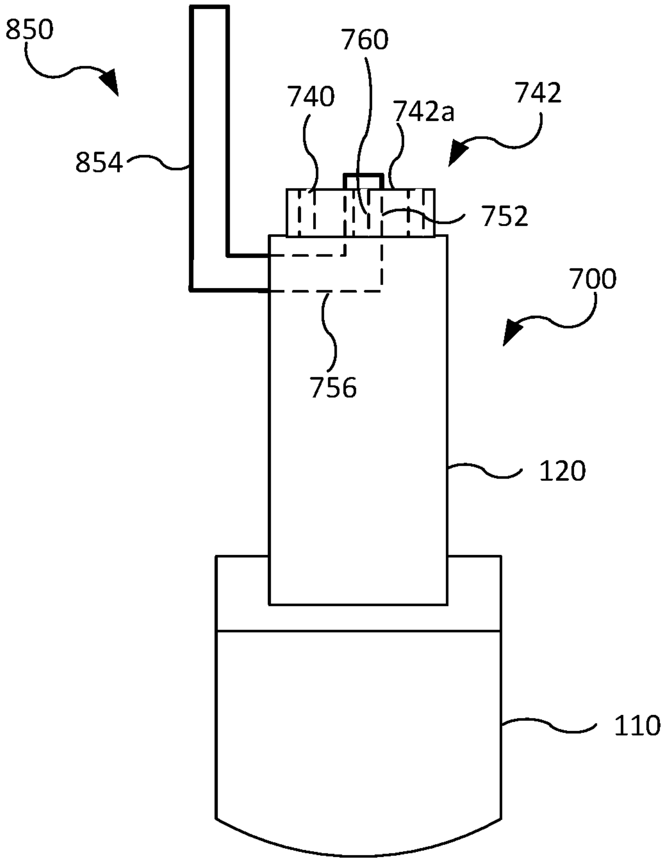


FIG. 8

900

Transfer power inductively at first rate to charge power storage device of head-mounted display unit (e.g., when not on head of user and/or when not displaying graphics)
910

Transfer power inductively at second rate, lower than the first rate, to power display unit of the head-mounted display unit (e.g., when on head of user and/or when displaying graphics)
920

FIG. 9

# DISPLAY SYSTEM

## CROSS-REFERENCE TO RELATED APPLICATION(S)

This application claims priority to and the benefit of U.S. Provisional Application No. 62/729,383, filed Sep. 10, 2018, the entire disclosure of which is incorporated by reference herein.

## TECHNICAL FIELD

This disclosure relates to display systems and, in particular, head-mounted display systems and power supply devices thereof.

## BACKGROUND

Wearable devices are subject to contaminants produced by the user wearing the device and of the environment. User contaminants may, for example, include body oils, sweat, and soap residue. Environmental contaminants may, for example, include water, chemicals, and dust, among others.

## SUMMARY

Disclosed herein are implementations display systems, including head-mounted displays and power supply devices.

In one implementation, a head-mounted display includes a display unit, a head support, a power storage device, and one or more receiving coils. The head support is coupled to the display unit and configured to engage a head of a user for supporting the display unit thereon. The power storage device is coupled to the display unit for storing power to be supplied to the display unit. The one or more receiving coils are coupled to the head support and located rearward of the display unit for inductively charging the power storage device.

The head-mounted display may include two or more of the receiving coils spaced apart along the head support. The head support may include a receiver having a housing containing a receiving coil, the receiver defining an aperture for receiving a protrusion having a transmission coil of a power supply device.

In one implementation, a display system includes a head-mounted display and a power supply device. The head-mounted display includes a display unit, a head support, a power storage device, and a receiving coil. The head support is coupled to the display unit for engaging and extending alone one or both of a left side or a right side of a head of a user to support the display unit thereon. The power storage device is coupled to the display unit for supplying power to the display unit. The receiving coil is coupled to and co-located with the head support for inductively charging the power storage device. The power supply device includes a base, a transmission coil, and a power source. The transmission coil is coupled to the base. The power source is coupled to the transmission coil. The head-mounted display and the power supply device are cooperatively configured to align the transmission coil with the receiving coil for the transmission coil to produce an electromagnetic field that passes through the receiving coil for charging the power storage device.

In another implementation, a method is provided for supplying power to a head-mounted display with a power supply device. The method includes in a first mode, when the head-mounted display is not worn by a user, inductively



supplying power at a first rate from the power supply device to the head-mounted display to charge a power storage device of the head-mounted display. The method further includes in a second mode, when the head-mounted display is worn by a user, inductively supplying the power at a second rate from the power supply device to the head-mounted display to power a display unit of the head-mounted display, the second rate being lower than the first rate.

## BRIEF DESCRIPTION OF THE DRAWINGS

FIG. **1**A is a top view of a head-mounted display on a head of a user.

FIG. **1**B is a side elevation view of the head-mounted display of FIG. **1**A on the head of the user.

FIG. **2**A is a top view of the head-mounted display of FIG. **1**A in a first state (solid lines) and a second state (dash-dot lines) with select hidden components shown in dashed lines.

FIG. **2**B is a cross-sectional view of the head-mounted display of FIG. **1**A taken along line **2**B-**2**B in FIG. **2**A with select hidden components depicted in dashed lines.

FIG. **2**C is a top view of a variation of the head-mounted display of FIG. **1**A with select components depicted in dashed lines.

FIG. **2**D is a top view of another variation of the head-mounted display of FIG. **1**A.

FIG. **3**A is a front view of a power supply device for the head-mounted display of FIG. **1**A with select hidden components shown in dashed lines.

FIG. **3**B is a top view of the power supply device of FIG. **3**A shown in a first state (solid lines) and a second state (dash-dot lines).

FIG. **3**C is a top view of the head-mounted display of FIG. **1**A with the power supply device of FIG. **3**A coupled thereto.

FIG. **3**D is a cross-sectional view of the head-mounted display of FIG. **1**A and the power supply device of FIG. **3**A taken along line **3**D-**3**D in FIG. **3**C.

FIG. **3**E is a cross-sectional view of the head-mounted display of FIG. **1**A and the power supply device of FIG. **3**A taken along line **3**E-**3**E in FIG. **3**C.

FIG. **4**A is a front view of another power supply device with select hidden components shown in dashed lines.

FIG. **4**B is a front view of the power supply device of FIG. **4**A with the head-mounted display of FIG. **1**A supported thereon.

FIG. **4**C is a side view of the power supply device of FIG. **4**A.

FIG. **4**D is a side view of the power supply device of FIG. **4**A with the head-mounted display of FIG. **1**A supported thereon.

FIG. **5**A is a perspective view of the head-mounted display of FIG. **1**A and another power supply device.

FIG. **5**B is a top view of the power supply device of FIG. **5**A with select hidden components depicted in dashed lines.

FIG. **5**C is a top view of the head-mounted display of FIG. **1**A in the power supply device of FIG. **5**A.

FIG. **5**D is a side view of the head-mounted display of FIG. **1**A in the power supply device of FIG. **5**A with select hidden components depicted in dashed lines and a lid of the power supply device depicted in dash-dot lines.

FIG. **6**A is a top view of another power supply device with select hidden components depicted in dashed lines.

FIG. **6**B is a side view of the power supply device of FIG. **6**A with select hidden features depicted in dashed lines.

FIG. **6**C is a top view the head-mounted display of FIG. **1**A on the power supply device of FIG. **6**A with select hidden components depicted in dashed lines.

FIG. **6**D is a side view the head-mounted display of FIG. **1**A on the power supply device of FIG. **6**A with select hidden features depicted in dashed lines.

FIG. **7**A is a top view of another head-mounted display.

FIG. **7**B is a cross-sectional view of the head-mounted display of FIG. **7**A taken along line **7**B-**7**B in FIG. **7**A.

FIG. **7**C is a front view of another power supply device.

FIG. **7**D is a side view of the power supply device of FIG. **7**C.

FIG. **7**E is a front view of the head-mounted display of FIG. **7**A on the power supply device of FIG. **7**C with select hidden components depicted in dashed lines.

FIG. **7**F is a side view of the head-mounted display of FIG. **7**A on the power supply device of FIG. **7**C with select hidden components depicted in dashed lines.

FIG. **7**G is a cross sectional view of the head-mounted display of FIG. **7**A on the power supply device of FIG. **7**C taken along line **7**G-**7**G in FIG. **7**E.

FIG. **8** is a side view of the head-mounted display of FIG. **7**A on another power supply device.

FIG. **9** is a flowchart of a method for supplying power to a head-mounted display.

## DETAILED DESCRIPTION

Disclosed herein are embodiments of wearable displays and power supply devices therefor and, in particular, displays that are to be worn on a head of a user, which may be referred to as a head-mounted display (HMD). The head-mounted displays and the power supply devices corresponding thereto are configured to transmit electrical power wirelessly therebetween (e.g., inductively). The head-mounted display may thereby be powered wirelessly (e.g., inductively) and a power storage device thereof (e.g., a battery) may be wirelessly charged (e.g., inductively charged).

Conventional conductive charging requires physical access to power contacts (e.g., terminals), which are, thereby, subject to contact with the aforementioned contaminants and related degradation, and which may also provide leak paths for the contaminants to reach internal components of the device being powered. Wireless charging (e.g., inductive charging) allows power receiving components (e.g., induction coils) to be contained (e.g., sealed) in other structures, thereby being isolated from the contaminants, while also providing fewer leak paths for the contaminants to reach other electronic components subject to degradation with exposure thereto. Beyond limiting exposure to contaminants, wireless charging (e.g., inductive charging) may provide other benefits over conventional conductive charging, such as different form factors and resultant physical interaction between the wearable display and the power supply device, which may be easier for users and/or provide an otherwise improved user experience.

Referring to FIGS. **1**A and **1**B, a head-mounted display **100** is a device that is to be worn on a head H of a user and that displays graphic content to the user, such as with computer-generated reality (as discussed below). The head-mounted display **100** generally includes a display unit **110**, a head support **120**, and a power storage device **130**. The display unit **110** may, for example, include a housing and one or more display screens (e.g., liquid crystal display (LCD), organic light-emitting diodes (OLED)), which are coupled to the housing (e.g., contained thereby) and display light directly to eyes of the user or project light onto a reflector (e.g., a lens) to be reflected to the user. The housing of the display unit **110** may engage a front side of the head H of the user (e.g., the nose or face of the user, such as in areas surrounding the eyes of the user).

The head support **120** is coupled to the display unit **110** and engages the head H of the user, so as to support the display unit **110** on the head H of the user. The head support **120** may, for example, be configured as a single- or multi-piece strap or band that extends rearward of the display unit **110** along left and/or right sides of the head H of the user and may further extend behind the head H of the user (as shown). In conjunction with the display unit **110**, the head support **120** may wholly or partially surround (e.g., circumscribe) the head H of the user. The head support **120** may, for example, include or be made of one or more flexible and/or elastic materials. For example, the head support **120** may be formed of a rubber or other polymeric material, which seals electrical components (e.g., induction coils, discussed below) of the head-mounted display **100** therein. Such electrical components may, for example, be coupled to a flexible circuit board contained (e.g., sealed within) the rubber or other polymeric material.

The power storage device **130** is, for example, a battery that stores energy for providing electrical power to the display unit **110** and other electronics (not shown) of the head-mounted display **100**, such as processors, sensors, and/or transceivers. In other implementations, the power storage device **130** may be omitted in which case the power supply devices supply power for operating, but not charging, the head-mounted display **100**.

Referring to FIGS. **2**A-**2**D, the head-mounted display **100** is configured to supply electrical power wirelessly (e.g., via induction) to the head-mounted display **100** to power the display unit **110** and other electronic components thereof (e.g., computing components) and/or to charge the power storage device **130**. With wireless power transfer, and in particular inductive power transfer or inductive charging, power-transfer electronics of the head-mounted display **100** may be covered and/or sealed from exposure to contaminants from the user (e.g., body oils, sweat, soap residue) and the environment (e.g., water). In contrast, with conventional conductive charging, conductive charging contacts must be accessible to allow physical contact therewith, which may expose the charging contacts to the aforementioned contaminants, provide leak paths for the contaminants to reach electronic components, and degradation associated therewith.

The head-mounted display **100** include one or more induction coils **240** (e.g., two, three (as shown), four, five, or more), which are coupled to the head support **120** of the head-mounted display **100**. To distinguish from induction coils **360** of the power supply devices (discussed below), the induction coils **240** of the head-mounted display **100** are referred to herein as receiving coils **240**, while the induction coils **360** of the power supply devices are referred to herein as transmission coils **360**. The induction coils of the various head-mounted displays and the power supply devices discussed below may also be referred to cooperatively as induction coils **240**, **360** (or **740**, **760**).

The receiving coils **240**, which are depicted in dashed lines, may be hidden from view and/or protected from the contaminants described above. For example, the receiving coils **240** may be covered by (e.g., hidden), contained by (e.g., sealed), or embedded in the head support **120**. Instead or additionally, the receiving coils **240** may include one or more coil housings (not shown), which contain (e.g., seal) one or more of the receiving coils **240** therein for protection from the contaminants. If contained in a coil housing, the housing and, thereby, the receiving coil **240** may be coupled to an exterior surface of the head support **120**.

One of more corresponding power supply devices, which will be discussed in further detail below, include the induction coils **360**, referenced above, that correspond to the receiving coils **240**. The head-mounted display **100** and the various power supply devices are additionally cooperatively configured to ensure proper alignment between the receiving coils **240** and the transmission coils **360**, respectively, thereof. The induction coils **240**, **360** are configured to be laterally aligned (e.g., being coaxial) and spaced apart (e.g., in the axial direction).

Referring still to FIGS. **2A-2B**, the one or more receiving coils **240** are coupled to the head support **120** at one or more locations of the head support **120** (e.g., being co-located with the head support **120** generally rearward of the display unit **110**), and may be distributed (e.g., spaced apart) along a length of the head support **120**. As such, the receiving coils **240** may be located along the left and/or right sides of the head H of the user and/or behind the head H of the user. As compared to using a one of the receiving coils **240** of comparable size, multiple receiving coils **240** allow the power storage device **130** to be charged at a higher rate. The receiving coils **240** are in wired connection with the display unit **110**, the power storage device **130**, or other suitable power electronics associated therewith.

The head support **120** is configured to accommodate different shapes and sizes of heads H of different users, for example, by being flexible and/or expandable (e.g., adjustable in length). The head support **120** may be flexible to conform with the different shapes of the heads H of the different users. As shown in FIG. **2A**, the receiving coils **240** may be flexible and/or curved, such that the head support **120** conform to different curvatures of the heads H of the users. To accommodate the different curvatures of the heads H of the users, the receiving coils **240** may be curved only a small amount (e.g., 15 degrees or less) and/or require bending only a small amount. Alternatively, as shown in FIG. **2C**, the receiving coils **240** may be planar and/or generally rigid, while the head support **120** (e.g., the strap or band) is flexible therebetween. Instead or additionally, as shown in FIG. **2D**, the head support **120** may include a compressible material **226** on an inner side thereof (e.g., a foam), which is arranged between the receiving coils **240** and the head H of the user to accommodate the different shapes of the heads H of the different users. The compressible material **226** may be used with either the receiving coils **240** that are either flexible or rigid and/or curved or planar.

The head support **120** may also be expandable in length (e.g., adjustable in length) to accommodate the different sizes of the heads H of the different users. For example, the head support **120** may have a first length (e.g., a stored or resting length) from which the head support **120** may increase in length to accommodate the different sizes of the heads H of the different users (e.g., indicated by the arrows in FIG. **2A**). At the first length of the head support **120**, the receiving coils **240** are arranged in a first lateral configuration relative to each other (i.e., are in spaced-apart lateral positions left-to-right and up-to-down). With the head support **120** being flexible, the receiving coils **240** may be arranged at different angular orientations while still in the first lateral configuration (e.g., axes of the receiving coils **240** changing angles therebetween). The receiving coils **240** may, for example, not overlap each other.

In one example, the length of the head support **120** may change by being elastic, so as to stretch from the first length to a suitable length to accommodate the head H of different users and thereafter retract back to the first length. For example, the head support **120** may elastic in length in regions adjacent (e.g., between) the receiving coils **240**. (e.g., indicated by the individual arrows in FIG. **2B**), while regions of the head support **120** coupled to (e.g., containing) the receiving coils **240** are inelastic. When the head support **120** is expanded from the first length, the lateral configuration of the receiving coils **240** may change (e.g., increasing in lateral spacing therebetween). When the head support **120** is removed from the head H of the user, the head support **120** retracts due to the elasticity back to the first length with the receiving coils **240** in the first lateral configuration.

In another example, the head support **120** may be inelastic in regions between two or more of the receiving coils **240** (e.g., between all of the receiving coils **240**), while being elastic in regions beyond the receiving coils **240** (e.g., between end ones of the receiving coils **240** and the display unit **110**) (e.g., indicated by arrows in FIG. **2C**). In such case, regardless of the length of the head support **120**, the receiving coils **240** may be held in a constant (e.g., fixed distance or fixed positions) lateral configuration relative to each other (e.g., being coupled to a common flexible circuit board).

In a further example, the head support **120** changes in length by coupling to the display unit **110** at different locations thereof and/or by coupling multiple portions of the head support **120** (e.g., being a multi-piece band or strap) together at different locations with a mechanical fastening mechanism (e.g., buckles, clasps, magnets, hook and look fasteners, or other suitable mechanisms). In such cases the head support **120** may be elastic or inelastic and the lateral configuration of the receiving coils **240** may or may not change, respectively, depending on the length of the head support **120**.

Referring to FIGS. **3A-3E**, one or more power supply devices are configured to supply power and/or charge the head-mounted display **100**. The power supply device and the head-mounted display **100** may be considered to cooperatively form a display system. As referenced above, the power supply device includes transmission coils **360**. The transmission coils **360** generate electromagnetic fields that pass through the receiving coils **240**, when aligned therewith, to be converted into electrical power. The power supply devices and the head-mounted display **100** include cooperative alignment components (e.g., mechanical features and/or magnets) that interact with each other to ensure proper alignment.

Still referring to FIGS. **3A-3E**, a power supply device **350** is configured as a flexible structure that conforms to the shape of the head support **120**. The power supply device **350** generally includes a body **352** that is flexible, a power cord **354**, and one or more transmission coils **360**, as described above.

The power cord **354** is configured to connect the power supply device **350** to a power source to provide electrical power to the transmission coils **360**.

The transmission coils **360** are coupled to the body **352**, which is in turn coupleable to the head support **120** of the head-mounted display **100**. The transmission coils **360** correspond to the receiving coils **240** of the head-mounted display **100**. The transmission coils **360** may be provided in equal number as the receiving coils **240** (e.g., three as shown). The transmission coils **360** are coupled to the body **352** at positions corresponding to the positions of the receiving coils **240** on the head support **120**, for example, mirroring the first lateral configuration of the receiving coils **240**. As a result, when the body **352** of the power supply device **350** is coupled to the head support **120** of the head-mounted display **100**, the transmission coils **360** are laterally aligned with the receiving coils **240** corresponding thereto, as indicated by axes thereof shown in dash-dot lines.

As referenced above, the body **352** is flexible to allow the body **352** to conform to the shape of the head support **120** of the head-mounted display **100** (as indicated by arrows in FIG. **3**B). The body **352** may also hold the transmission coils **360** in fixed lateral positions relative to each other, which correspond to positions of the receiving coils **240** on the head support **120**.

The body **352** may, for example, include a polymer sheet material (e.g., a flexible circuit board) to which are coupled the transmission coils **360**. The body **352** may also include a housing or cover (e.g., polymer, rubber, fabric), which covers and/or contains from contaminants the transmission coils **360** and other electronics (e.g., printed circuits, wires, etc.) of the power supply device **350**.

The transmission coils **360** may also be flexible to conform to the shape of the head support **120** and/or the receiving coils **240** of the head-mounted display **100** and/or curved (as shown), or may be rigid with the body **352** being flexible therebetween (e.g., being curved or planar depending on the corresponding receiving coils **240**).

The body **352** is configured to couple to the head support **120**, so as to hold the transmission coils **360** in suitable alignment with and proximity to the receiving coils **240**. For example, as shown in FIGS. **3**D and **3**E, the power supply device **350** and the head support **120** include corresponding magnetic coupling features **356**, **322**, respectively, which attract each other with magnetic force (e.g., magnets and corresponding attractor plates). The magnetic coupling features **356**, **322** are suitable to hold the body **352** adjacent to the head support **120** and, thereby, the transmission coils **360** in suitable proximity to the receiving coils **240** for inductive power transfer (e.g., along the axes of the induction coils **240**, **360**). The magnetic coupling features **356**, **322** may additionally function to align the transmission coils **360** with the receiving coils **240** for inductive charging (e.g., using magnetic force to draw the induction coils **240**, **360** into alignment). The magnetic coupling features **356**, **322** may, accordingly, be referred to as alignment features. As shown in FIG. **3**D, the magnetic coupling features **356** of the power supply device **350** may be positioned between and beyond the induction coils **240**, **360** (e.g., four locations for the three sets of induction coils **240**, **360**). Instead or additionally, the magnetic coupling features **322**, **356** may be co-located with the induction coils **240**, **360** (e.g., being positioned radially inward of the induction coils **240**, **360**).

Other alignment features, such as mechanical alignment features **358**, **324** of the power supply device **350** and the head support **120**, respectively, may be used in conjunction with the magnetic coupling features **356**, **322** to ensure proper alignment (e.g., laterally) between the body **352** and the head support **120** and, thereby, between the transmission coils **360** and the receiving coils **240** for inductive charging. For example, as shown in FIGS. **3**D and **3**E, the mechanical alignment features **324**, **358** may be configured as a recess and a protrusion, respectively, that mechanically interface to prevent movement lateral movement between the head support **120** and the body **352** of the power supply device **350** and may also function to guide power supply device **350** into proper alignment with the head support **120** (e.g., having tapered or rounded surfaces, as shown). As shown in FIG. **3**D, the magnetic coupling features **356**, **322** and/or the mechanical alignment features **358**, **324** may be positioned adjacent and/or between the induction coils **240**, **360** (e.g., four locations for three sets of the induction coils **240**, **360**). Instead or additionally, as shown in FIG. **3**E, the mechanical alignment features **358**, **324** may be co-located with the induction coils **240**, **360** (e.g., be centrally located thereto within the induction coils **240**, **360**, such as coaxial therewith).

As an alternative to the magnetic coupling features **356**, **322** and/or the mechanical alignment features **358**, **324**, the power supply device **350** may instead mechanically couple to the head support **120** of the head-mounted display **100** in other manners, for example, with male-to-female couplings (e.g., posts of the power supply device **350** extending through apertures of the head support **120**; spring clips, clasps, or latches, among others).

Furthermore, while the power supply device **350** is shown coupled to an inner surface of the head support **120**, the power supply device **350** may instead be coupleable to an outer surface of the head support **120**, or may be interchangeably coupleable to each of the inner surface and the outer surface of the head support **120**.

Referring to FIG. **4**A-**4**D, a power supply device **450** includes a rigid structure that engages the head support **120** of the head-mounted display **100**. For example, the power supply device **450** is configured as a stand that supports the head-mounted display **100**.

The power supply device **450** generally includes a rigid support **452** and a base **454**, as well as a power cord or other power source (not shown), such as the power cord **354** described previously. The base **454** is configured to stably rest on a flat surface (e.g., a desk, a table, or a shelf) and extends upward therefrom. The rigid support **452** protrudes forward from the base **454**, so as to extend through the center of the head-mounted display **100** to engage thereabove an interior surface of the head support **120** and support the head-mounted display **100** above the flat surface. Alternatively, the rigid support **452** may be configured as a hook, which is coupleable to another object (e.g., a wall or furniture) for supporting the head-mounted display **100**.

The rigid support **452** includes the transmission coils **360**. The rigid support **452**, for example, includes a housing that contains the transmission coils **360** therein and which engages the inner surface of the head support **120** of the head-mounted display **100**. The transmission coils **360** are coupled to the rigid support **452** at positions corresponding to the positions of the receiving coils **240** on the head support **120** (e.g., having equal spacing therebetween). As a result, when the head support **120** of the head-mounted display **100** rests on the rigid support **452** of the power supply device **450**, the transmission coils **360** are aligned with the receiving coils **240** corresponding thereto.

As referenced above, the rigid support **452** is rigid, so as to generally not bend or flex when the head-mounted display **100** is placed thereon. The head support **120** may, in some manners, conform to a shape of the upper surface of the rigid support **452**. The housing or upper surface of the rigid support **452**, for example, be formed of a polymer material (e.g., plastic) or other material (e.g., glass) that allows transmission of the electromagnetic field to pass therethrough from the transmission coils **360** to the receiving coils **240** of the head-mounted display **100**.

The transmission coils **360** may be shaped to mirror the shape of the receiving coils **240** corresponding thereto, may be curved (as shown), or may be straight (e.g., planar).

The rigid support **452** and the head support **120** are cooperatively configured to align and hold in close proximity the transmission coils **360** and the receiving coils **240** to facilitate inductive power transfer therebetween. For example, the rigid support **452** and the head support **120** may include the magnetic coupling features **356**, **322** and/or the mechanical alignment features **358**, **324** described previously (e.g., positioned between or co-located with the induction coils **360**, **240**, respectively). Instead or additionally, the upper surface of the rigid support **452** and the inner surface of the head support **120** cooperatively form a low friction interface. As a result, the magnetic coupling features **356**, **322**, the mechanical alignment features **358**, **324**, and/or gravity (e.g., causing the display unit **110** to rotate to a bottom position) may cause the head-mounted display **100** to slide easily left-to-right to properly align the induction coils **360**, **240**.

Instead or additionally, the rigid support **452** may include one or more guides **452***a* (e.g., protrusions or recessed surfaces) that extend upward in front of and/or behind the head support **120** (e.g., behind as shown) to hinder front-to-back movement of the head support **120**.

Weight of the head-mounted display **100** (e.g., of the display unit **110**, the power storage device **130**, and/or any additional components) may pull the receiving coils **240** downward into close proximity to the transmission coils **360**.

Referring to FIGS. **5**A-**5**D, a power supply device **550** is configured as a storage container (e.g., a case or a box) in which the head-mounted display **100** may contained.

The power supply device **550** generally includes a base **552** that defines a receptacle **552***a* therein for receipt of the head-mounted display **100** therein. The power supply device **550** may additionally include a lid **556** (shown in dash-dot lines in FIG. **5**D) that is configured to close the receptacle **552***a* with the head-mounted display **100** therein. The power supply device **550** further includes one or more power sources, which may include the power cord **354** described above and/or a power storage device **554** (e.g., a battery) for charging the power storage device **130** of the head-mounted display **100**.

The receptacle is defined by an inner wall **552***b*, which is complementary to the outer surface of the head support **120**. The transmission coils **360** are incorporated into the base **552** in fixed spatial relationship to each other (e.g., being coupled to the inner wall **552***b*) corresponding to the lateral configuration of the receiving coils **240** of the head support **120** corresponding thereto.

The power supply device **550** and the head-mounted display **100** are cooperatively configured to align the receiving coils **240** of the head support **120** with the transmission coils **360** of the power supply device **550**. For example, the base **552** (e.g., behind the inner wall **552***b*) and the head support **120** may include the magnetic coupling features **356**, **322** and/or the mechanical alignment features **358**, **324** described previously (e.g., positioned between or co-located with the induction coils **360**, **240**, respectively).

Instead or additionally, the power supply device **550** may include one or more protrusions within the receptacle **552***a*, which functions as a guide that biases and/or holds the head support **120** and, thereby, the receiving coils **240** into proper distance from and alignment with the transmission coils **360**. Such a protrusion may, for example, be configured as a head support receptor **652***a* described in further detail below and may or may not include transmission coils **360** to be positioned proximate an interior of the head support **120**. The head support **120** is then positioned between the back wall **552***b* of the receptacle **552***a* and the head support receptor **652***a* described below.

The receptacle **552***a* may further define a secondary recess (not labeled), which is complementary to and receives the display unit **110** therein, so as to properly align head support **120**.

Referring to FIGS. **6**A-**6**D, a power supply device **650** is configured as a platform or mat on which the head-mounted display **100** may be placed.

The power supply device **650** generally includes a base **652** that is complementary to and receives various lower portions of the head-mounted display **100**. For example, the base **652** may include a head support receptor **652***a* and a display receptor **652***b*. The head support receptor **652***a* is configured as a protrusion that extends upward from surrounding portions of the base **652** to the head support **120** of the head-mounted display **100** thereover. The transmission coils **360** are coupled to the head support receptor **652***a* for alignment with the receiving coils **240** corresponding thereto. For example, the transmission coils **360** may be in a fixed spatial arrangement mirroring the lateral configuration of the receiving coils **240**. The length of the head support **120** may hold the receiving coils **240** in close proximity to the transmission coils **360** and/or the head support **120** may be in tension (e.g., if elastic, as described above) against the head support receptor **652***a*.

The display receptor **652***b* is, for example, configured as a receptacle that receives a lower portion of the display unit **110** of the head-mounted display **100**. The display receptor **652***b* may be shaped so as to receive the display unit **110** in one position, which may also orient the head support **120** relative to the display receptor **652***b* for alignment of the induction coils **240**, **360**.

The power supply device **650** and the head-mounted display **100** may be configured in other and/or additional manners to align the receiving coils **240** of the head support **120** with the transmission coils **360** of the power supply device **650**. For example, the head support receptor **652***a* and the head support **120** may include the magnetic coupling features **356**, **322** and/or the mechanical alignment features **358**, **324** described previously (e.g., positioned between or co-located with the induction coils **360**, **240**, respectively).

The power supply device **650** further includes one or more power sources, which may include the power cord **354** described above and/or a power storage device **554** (e.g., a battery) for charging the power storage device **130** of the head-mounted display **100**.

Referring still to FIGS. **7**A-**7**G, a head-mounted display **700** is a variation of the head-mounted display **100**, which includes a receiving coil **740** that is configured to receive a transmission coil **760** of a power supply device **750** therethrough. Thus, as opposed to the induction coils **240**, **360** being arranged generally parallel with each other for charging, the induction coils **740**, **760** are instead arranged coincident with each other in a female-to-male relationship (e.g., being concentric with each other). Power transfer between the induction coils **740**, **760** occurs in the same manner as for the induction coils **240**, **360** by the transmission coil **760** outputting an electromagnetic field that passes through and is converted into electrical power by the receiving coils **240**. The coincident relationship between the induction coils **740**, **760** may, however, transfer more power than the induction coils **240**, **360** of comparable area, such that the number of the induction coils **740**, **760** may be reduced and still achieve comparable power transfer.

The head-mounted display **700** is configured as the head-mounted display **100** described previously, but rather than include the receiving coils **240**, instead includes the receiving coil **740**. The receiving coil **740** is part of a receiver **742** that is coupled to the head support **120**, for example, at a position generally opposite the display unit **110**. The receiver **742** is configured to mate with the power supply device **750** to support the head-mounted display **700** thereby. The receiver **742** includes a housing **742***a* that encloses the receiving coil **740** and defines an aperture **742***b* therethrough.

The power supply device **750** is configured to be inserted into the aperture **742***b* of the receiver **742** and, thereby, support and position the head-mounted display **700** relative thereto. The power supply device **750**, as shown, includes a protrusion **752**. The protrusion **752** includes a housing **752***a* in which is positioned the transmission coil **760**. The protrusion **752** interfaces with the receiver **742**, so as to support the head-mounted display **700** and align the transmission coil **760** within the receiving coil **740** for charging the head-mounted display **700**. While only one of the receivers **742** is shown, the power supply device **750** may include additional receivers **742** and the power supply device **750** additional protrusions **752** containing the transmission coils **760**.

As shown, the power supply device **750** is configured as a stand. The power supply device generally includes the protrusion **752** and a base **754**, as well as a power cord or other power source (not shown), such as the power cord **354** described previously and/or the power storage device **554**. The base **754** is configured to stably rest on a flat surface (e.g., a desk, a table, floor or a shelf) and extends upward therefrom. An arm **756** extends forward from the base **754**, while the protrusion **752** extends upward from the arm **756** to be inserted into the aperture **742***b* of the receiver **742**. The arm **756**, or another portion of the protrusion **752** (e.g., a flange), may engage the receiver **742** and/or the head support **120** to support the head-mounted display **700** thereon. For example, the protrusion **752** may extend upward from a structure shaped as the rigid support **452**, so as to engage and support the head support **120**.

In another example, shown in FIG. **8**, a power supply device **850** includes or is provided as a hook. The power supply device **850** includes the protrusion **752** described previously (e.g., having the housing **752***a* with the transmission coil **760** therein) and the arm **756**. In one example, as shown, the power supply device **850** includes a shank **854** that extends upward from the arm **756** and is spaced apart from the protrusion **752** a sufficient distance (e.g., a gap) to receive a portion of the head support **120** and the receiver **742** therebetween. The shank **854** may be coupled to a wall, furniture, or other support structure.

Referring to FIG. **9**, a method **900** is provided for supplying power to a head-mounted display, such as the head-mounted displays **100**, **700**. In a first operation **910**, electrical power is supplied inductively from a power supply device (e.g., the power supply device **350**, **850**, or suitable variations thereof) to the head-mounted display at a first rate (e.g., a high rate) to charge a power storage device of the head-mounted display. During the first operation **910**, the head-mounted display **100** may not be worn by a user and/or the display unit **110** may be operated in a low-power state (e.g., no power and/or no graphics displayed).

In a second operation **920**, electrical power is supplied inductively from a power supply device, which may be the same power supply device used in the first operation **910**, at a second rate (e.g., a low rate) sufficient to power a display unit (e.g., the display unit **110**) of the head-mounted display **100**. During the second operation, the head-mounted display **100** is worn by a user and/or the display unit **110** may be operated in a high-power state (e.g., displaying graphics to the user).

The second rate is lower than the first rate but sufficient to power the head-mounted display **100**, including the display unit **110**. The second rate may, for example, be less than 50% of the first rate, such as 25% or less of the first rate, or 10% or less of the first rate. Heat is generated by inefficiencies in inductive power transfer, thus by lowering the power transfer rate, less heat will be generated in the second mode than in the first mode. Thus, while worn by a user in the second mode with lower power transfer, less heat may be transferred during power transfer and the user may be more comfortable.

The lower power transfer rate of the second operation **920** may be achieved by one or more of (a) transferring power with fewer of the induction coils **240**, **360**, **740**, **760** than in the first operation **910** (e.g., one set or two sets instead of three sets) or (b) transferring power at a lower rate through each of the induction coils **240**, **360**, **740**, **760** than in the first operation **910** (e.g., at a lower rate through each of the same induction coils).

The method **900** may be implemented using a suitable computing device (e.g., having a processor, volatile memory, and non-volatile memory), which executes suitable instructions stored in software programming (e.g., code) associated with the first operation **910** and the second operation **920**. The method may be further implemented with one or more sensors, which may, for example, detect when the head-mounted display is positioned on the head H of the user and/or when the display unit thereof is displaying graphic content.

A physical environment refers to a physical world that people can sense and/or interact with without aid of electronic systems. Physical environments, such as a physical park, include physical articles, such as physical trees, physical buildings, and physical people. People can directly sense and/or interact with the physical environment, such as through sight, touch, hearing, taste, and smell.

In contrast, a computer-generated reality (CGR) environment refers to a wholly or partially simulated environment that people sense and/or interact with via an electronic system. In CGR, a subset of a person's physical motions, or representations thereof, are tracked, and, in response, one or more characteristics of one or more virtual objects simulated in the CGR environment are adjusted in a manner that comports with at least one law of physics. For example, a CGR system may detect a person's head turning and, in response, adjust graphical content and an acoustic field presented to the person in a manner similar to how such views and sounds would change in a physical environment. In some situations (e.g., for accessibility reasons), adjustments to characteristic(s) of virtual object(s) in a CGR environment may be made in response to representations of physical motions (e.g., vocal commands).

A person may sense and/or interact with a CGR object using any one of their senses, including sight, sound, touch, taste, and smell. For example, a person may sense and/or interact with audio objects that create 3D or spatial audio environment that provides the perception of point audio sources in 3D space. In another example, audio objects may enable audio transparency, which selectively incorporates ambient sounds from the physical environment with or without computer-generated audio. In some CGR environments, a person may sense and/or interact only with audio objects.

Examples of CGR include virtual reality and mixed reality.

A virtual reality (VR) environment refers to a simulated environment that is designed to be based entirely on computer-generated sensory inputs for one or more senses. A VR environment comprises a plurality of virtual objects with which a person may sense and/or interact. For example, computer-generated imagery of trees, buildings, and avatars representing people are examples of virtual objects. A person may sense and/or interact with virtual objects in the VR environment through a simulation of the person's presence within the computer-generated environment, and/or through a simulation of a subset of the person's physical movements within the computer-generated environment.

In contrast to a VR environment, which is designed to be based entirely on computer-generated sensory inputs, a mixed reality (MR) environment refers to a simulated environment that is designed to incorporate sensory inputs from the physical environment, or a representation thereof, in addition to including computer-generated sensory inputs (e.g., virtual objects). On a virtuality continuum, a mixed reality environment is anywhere between, but not including, a wholly physical environment at one end and virtual reality environment at the other end.

In some MR environments, computer-generated sensory inputs may respond to changes in sensory inputs from the physical environment. Also, some electronic systems for presenting an MR environment may track location and/or orientation with respect to the physical environment to enable virtual objects to interact with real objects (that is, physical articles from the physical environment or representations thereof). For example, a system may account for movements so that a virtual tree appears stationery with respect to the physical ground.

Examples of mixed realities include augmented reality and augmented virtuality.

An augmented reality (AR) environment refers to a simulated environment in which one or more virtual objects are superimposed over a physical environment, or a representation thereof. For example, an electronic system for presenting an AR environment may have a transparent or translucent display through which a person may directly view the physical environment. The system may be configured to present virtual objects on the transparent or translucent display, so that a person, using the system, perceives the virtual objects superimposed over the physical environment. Alternatively, a system may have an opaque display and one or more imaging sensors that capture images or video of the physical environment, which are representations of the physical environment. The system composites the images or video with virtual objects, and presents the composition on the opaque display. A person, using the system, indirectly views the physical environment by way of the images or video of the physical environment, and perceives the virtual objects superimposed over the physical environment. As used herein, a video of the physical environment shown on an opaque display is called "pass-through video," meaning a system uses one or more image sensor(s) to capture images of the physical environment, and uses those images in presenting the AR environment on the opaque display. Further alternatively, a system may have a projection system that projects virtual objects into the physical environment, for example, as a hologram or on a physical surface, so that a person, using the system, perceives the virtual objects superimposed over the physical environment.

An augmented reality environment also refers to a simulated environment in which a representation of a physical environment is transformed by computer-generated sensory information. For example, in providing pass-through video, a system may transform one or more sensor images to impose a select perspective (e.g., viewpoint) different than the perspective captured by the imaging sensors. As another example, a representation of a physical environment may be transformed by graphically modifying (e.g., enlarging) portions thereof, such that the modified portion may be representative but not photorealistic versions of the originally captured images. As a further example, a representation of a physical environment may be transformed by graphically eliminating or obfuscating portions thereof.

An augmented virtuality (AV) environment refers to a simulated environment in which a virtual or computer generated environment incorporates one or more sensory inputs from the physical environment. The sensory inputs may be representations of one or more characteristics of the physical environment. For example, an AV park may have virtual trees and virtual buildings, but people with faces photorealistically reproduced from images taken of physical people. As another example, a virtual object may adopt a shape or color of a physical article imaged by one or more imaging sensors. As a further example, a virtual object may adopt shadows consistent with the position of the sun in the physical environment.

There are many different types of electronic systems that enable a person to sense and/or interact with various CGR environments. Examples include head mounted systems, projection-based systems, heads-up displays (HUDs), vehicle windshields having integrated display capability, windows having integrated display capability, displays formed as lenses designed to be placed on a person's eyes (e.g., similar to contact lenses), headphones/earphones, speaker arrays, input systems (e.g., wearable or handheld controllers with or without haptic feedback), smartphones, tablets, and desktop/laptop computers. A head mounted system may have one or more speaker(s) and an integrated opaque display. Alternatively, a head mounted system may be configured to accept an external opaque display (e.g., a smartphone). The head mounted system may incorporate one or more imaging sensors to capture images or video of the physical environment, and/or one or more microphones to capture audio of the physical environment. Rather than an opaque display, a head mounted system may have a transparent or translucent display. The transparent or translucent display may have a medium through which light representative of images is directed to a person's eyes. The display may utilize digital light projection, OLEDs, LEDs, uLEDs, liquid crystal on silicon, laser scanning light source, or any combination of these technologies. The medium may be an optical waveguide, a hologram medium, an optical combiner, an optical reflector, or any combination thereof. In one embodiment, the transparent or translucent display may be configured to become opaque selectively. Projection-based systems may employ retinal projection technology that projects graphical images onto a person's retina. Projection systems also may be configured to project virtual objects into the physical environment, for example, as a hologram or on a physical surface.

As described above, one aspect of the present technology is the gathering and use of data available from various sources for content delivery and/or charging. The present disclosure contemplates that in some instances, this gathered data may include personal information data that uniquely identifies or can be used to contact or locate a specific person. Such personal information data can include demographic data, location-based data, telephone numbers, email addresses, twitter ID's, home addresses, data or records relating to a user's health or level of fitness (e.g., vital signs measurements, medication information, exercise information), date of birth, or any other identifying or personal information.

The present disclosure recognizes that the use of such personal information data, in the present technology, can be used to the benefit of users. For example, the personal information data can be used for content delivery and/or charging. Further, other uses for personal information data that benefit the user are also contemplated by the present disclosure. For instance, health and fitness data may be used to provide insights into a user's general wellness, or may be used as positive feedback to individuals using technology to pursue wellness goals.

The present disclosure contemplates that the entities responsible for the collection, analysis, disclosure, transfer, storage, or other use of such personal information data will comply with well-established privacy policies and/or privacy practices. In particular, such entities should implement and consistently use privacy policies and practices that are generally recognized as meeting or exceeding industry or governmental requirements for maintaining personal information data private and secure. Such policies should be easily accessible by users, and should be updated as the collection and/or use of data changes. Personal information from users should be collected for legitimate and reasonable uses of the entity and not shared or sold outside of those legitimate uses. Further, such collection/sharing should occur after receiving the informed consent of the users. Additionally, such entities should consider taking any needed steps for safeguarding and securing access to such personal information data and ensuring that others with access to the personal information data adhere to their privacy policies and procedures. Further, such entities can subject themselves to evaluation by third parties to certify their adherence to widely accepted privacy policies and practices. In addition, policies and practices should be adapted for the particular types of personal information data being collected and/or accessed and adapted to applicable laws and standards, including jurisdiction-specific considerations. For instance, in the US, collection of or access to certain health data may be governed by federal and/or state laws, such as the Health Insurance Portability and Accountability Act (HIPAA); whereas health data in other countries may be subject to other regulations and policies and should be handled accordingly. Hence different privacy practices should be maintained for different personal data types in each country.

Despite the foregoing, the present disclosure also contemplates embodiments in which users selectively block the use of, or access to, personal information data. That is, the present disclosure contemplates that hardware and/or software elements can be provided to prevent or block access to such personal information data. For example, in the case of for content delivery and/or charging, the present technology can be configured to allow users to select to "opt in" or "opt out" of participation in the collection of personal information data. In another example, users can select not to provide personal information data for content delivery and/or charging. In addition to providing "opt in" and "opt out" options, the present disclosure contemplates providing notifications relating to the access or use of personal information. For instance, a user may be notified upon downloading an app that their personal information data will be accessed and then reminded again just before personal information data is accessed by the app.

Moreover, it is the intent of the present disclosure that personal information data should be managed and handled in a way to minimize risks of unintentional or unauthorized access or use. Risk can be minimized by limiting the collection of data and deleting data once it is no longer needed. In addition, and when applicable, including in certain health related applications, data de-identification can be used to protect a user's privacy. De-identification may be facilitated, when appropriate, by removing specific identifiers (e.g., date of birth, etc.), controlling the amount or specificity of data stored (e.g., collecting location data a city level rather than at an address level), controlling how data is stored (e.g., aggregating data across users), and/or other methods.

Therefore, although the present disclosure broadly covers use of personal information data to implement one or more various disclosed embodiments, the present disclosure also contemplates that the various embodiments can also be implemented without the need for accessing such personal information data. That is, the various embodiments of the present technology are not rendered inoperable due to the lack of all or a portion of such personal information data. For example, content can be selected and delivered to users and/or charging be performed by inferring preferences based on non-personal information data or a bare minimum amount of personal information, such as the content being requested by the device associated with a user, other non-personal information available to the display system, or publicly available information.

What is claimed is:

**1**. A head-mounted display comprising:

a display unit;

a head support coupled to the display unit and configured to engage a head of a user for supporting the display unit thereon;

a power storage device for storing power to be supplied to the display unit; and

one or more receiving coils coupled to the head support and located rearward of the display unit for inductively charging the power storage device,

wherein the head support includes alignment features for aligning the one or more receiving coils with one or more transmission coils of a power supply device, each of the one or more receiving coils configured for inductive power transfer from a corresponding one of the one or more transmission coils when aligned.

**2**. The head-mounted display according to claim **1**, wherein the head support is configured as a band and is flexible, and two or more of the receiving coils are coupled to and spaced apart along the band.

**3**. The head-mounted display according to claim **1**, comprising two or more of the receiving coils spaced apart along the head support.

**4**. The head-mounted display according to claim **3**, wherein the head support is flexible, and axes of the two or more receiving coils are movable relative to each other.

**5**. The head-mounted display according to claim **4**, wherein the two or more receiving coils are fixed laterally relative to each other.

**6**. The head-mounted display according to claim **1**, wherein the alignment features are magnetic coupling features.

**7**. The head-mounted display according to claim **6**, wherein the alignment features further include mechanical alignment features.

**8**. The head-mounted display according to claim **1**, comprising two or more of the receiving coils, wherein the head support is a band that is adjustable in length and the two or more receiving coils are spaced apart a fixed distance along the band.

**9**. The head-mounted display according to claim **1**, wherein the head support includes a receiver having a housing containing the one or more receiving coils, the receiver defining an aperture for receiving a protrusion having a transmission coil of a power supply device.

**10**. A display system comprising:

a head-mounted display including:

a display unit,

a head support coupled to the display unit for engaging and extending along one or both of a left side or a right side of a head of a user to support the display unit thereon,

a power storage device coupled to the display unit for supplying power to the display unit, and

a receiving coil coupled to and co-located with the head support for inductively charging the power storage device; and

a power supply device including:

a base;

a transmission coil coupled to the base; and

a power source coupled to the transmission coil;

wherein the head-mounted display and the power supply device are cooperatively configured to align the transmission coil with the receiving coil for the transmission coil to produce an electromagnetic field that passes through the receiving coil for charging the power storage device.

**11**. The display system according to claim **10**, wherein the head support is a band that is flexible and adjustable in length, and the head-mounted display includes two or more of the receiving coils spaced apart along the band.

**12**. The display system according to claim **10**, wherein the head-mounted display includes a receiver coupled to the head support, the receiver having a housing that contains the receiving coil and that defines an aperture surrounded by the receiving coil; and

wherein the power supply device includes a protrusion formed by a housing that contains the transmission coil, the protrusion being insertable into the aperture of the receiver for aligning the transmission coil with the receiving coil.

**13**. The display system according to claim **12**, wherein the head-mounted display is configured to hang from the power supply device with the protrusion inserted into the aperture of the receiver.

**14**. The display system according to claim **10**, wherein the head-mounted display includes two or more of the receiving coils, and the power supply device includes two or more of the transmission coils.

**15**. The display system according to claim **14**, wherein the two or more transmission coils are in fixed positions relative to each other.

**16**. The display system according to claim **14**, wherein the head support is a band, and the two or more receiving coils are spaced apart along the band.

**17**. The display system according to claim **16**, wherein the band is adjustable in length, and the two or more receiving coils are coupled to the band in positions that are movable laterally relative to each other.

**18**. A method for supplying power to a head-mounted display with a power supply device, the method comprising:

in a first mode when the head-mounted display is not worn by a user, inductively supply power at a first rate from the power supply device to the head-mounted display to charge a power storage device of the head-mounted display; and

in a second mode when the head-mounted display is worn by a user, inductively supply the power at a second rate from the power supply device to the head-mounted display to power a display unit of the head-mounted display, the second rate being lower than the first rate.

**19**. The method according to claim **18**, wherein the power is inductively transferred with a same number of induction coils of the head-mounted display and the power supply device in the first mode and in the second mode.

**20**. The head-mounted display according to claim **1**, wherein the power storage device is coupled to the display unit.

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